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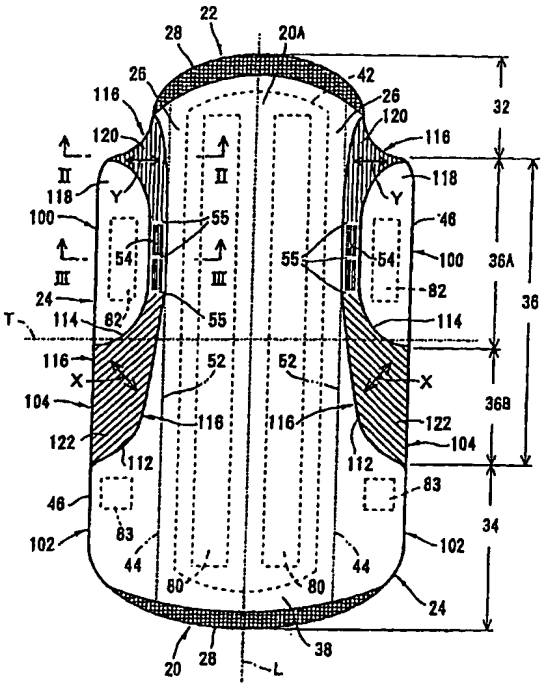
(54) Title: ABSORBENT ARTICLE

(57) Abstract

This invention is an absorbent article including a first flap (100) extending laterally outward from longitudinal side edges (26) of a main body portion (22). A second flap (102) is offset to one of longitudinal end edges (28) of the absorbent article (22), and formed with a larger width than a transverse width of the main body portion (22) at which the first flap (100) is positioned. The first flap (100) is folded over along a side edge of a leg opening of a wearer's undergarment (200). The second flap (102) is maintained in a broadened condition within the wearer's undergarment (200). A joining part (104) is provided to connect the first flap (100) with the second flap (102) on the outside of the longitudinal side edges (26) of the main body portion (22). A zone of extensibility (116) is provided in a region of at least a portion of the joining part (104) where the side edge of the leg opening of the undergarment (200) is placed when the absorbent article is used.



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ABSORBENT ARTICLE

FIELD OF THE INVENTION

The present invention relates to an absorbent article such as a sanitary napkin, panty liner, or adult incontinence products, and the like. Still more particularly, the present invention relates to an absorbent article such as a sanitary napkin, and the like which is configured so as to have a portion of a flap fold under a wearer's undergarment.

BACKGROUND OF THE INVENTION

Absorbent articles are available for use, particularly as a sanitary napkin having a wing or flap formed so as to be folded under the back of an undergarment along the side edges of leg openings of the wearer's undergarment. A first type of sanitary napkin is disclosed in the Japanese Laid-open Patent Publication S60-75058 (USP 4,589,876), the Japanese Laid-open Patent Publication S60-199446 (USP 4,687,478), the Japanese Laid-open Patent publication H2-501710 (WO 88/04546), and the Japanese Laid-open Patent Publication H5-505122 (WO 91/14415). A sanitary napkin having a flap with an elastic portion along the entire length of a longitudinal side portion is disclosed in the Japanese Laid-open Patent Publication H2-7956 (USP 4,940,462). When using this napkin, the entire flap is folded along the side edge of the leg opening of the undergarment.

A second type of a sanitary napkin is disclosed in the Japanese Laid-open Patent Publications H2-168949, H4-128728, H7-12120, and H7-33314. The sanitary napkin disclosed therein as prior art has a forward flap which is folded in use along the side edges of leg openings of the wearer's undergarment, a rearward flap which is provided at a position that is offsetted longitudinally to the rear of the sanitary napkin, and a narrow center part that is formed between these flaps.

While above-noted first type of the sanitary napkin has the effect of preventing leakage at the side edges of the leg openings of the undergarment, it does not provide sufficient prevention of leakage at the rear part of the sanitary napkin. In the above-noted second type of sanitary napkin, when using the sanitary napkin, the forward flap

is folded over along the side edge of the legs openings of the undergarment, thereby preventing the soiling of the side edge portion of the undergarment. However, because the narrow center part does not protect the side edges of the undergarment, a sufficient prevention of soiling is not provided to the portion of the leg opening side edges of the undergarment corresponding to the narrow center part.

Therefore, the present invention has as an object to provide an absorbent article which enables a widening of the protected region of the leg opening side edges of the undergarment when a portion of a flap is folded over around the undergarment.

Another object of the present invention is to provide an absorbent article of which a portion of a flap can be extended when a portion of a flap is folded over around the undergarment.

SUMMARY OF THE INVENTION

An absorbent article according to the present invention is an absorbent article comprising a main body portion, said main body portion comprising a liquid pervious body-facing surface, a liquid impervious garment-facing surface, and an absorbent core positioned between said body-facing surface and said garment-facing surface, said absorbent article comprising: a first flap extending laterally outward from longitudinal side edges of said main body portion, said first flap is adapted to be folded over along a side edge of leg opening of a wearer's undergarment, a second flap disposed at a position that is offsetted to one of longitudinal end edges of said absorbent article, said second flap being formed with a larger width than a transverse width of said main body portion at which said first flap is positioned, said second flap is adapted to be maintained in a broadened condition within the wearer's undergarment, a joining part connecting said first flap with said second flap on the outside of the longitudinal side edges of said main body portion, and a zone of extensibility provided in a region of at least a portion of said joining part where the side edge of the leg opening of the undergarment are placed when said absorbent article is used, said zone of extensibility, which is provided at said joining part, is extending to enclose the side edge of the leg opening of the undergarment when said first flap is folded over along the side edge of the leg opening of the undergarment.

An absorbent article according to the present invention is preferably configured as follows. Specifically, said joining part may be a region that is enclosed between said

first flap and said second flap in a longitudinal direction, said zone of extensibility comprising a corrugated region which is imparted to at least a portion of said joining part. Said first flap and said second flap may comprise a region with lower extensibility than that of said zone of extensibility. Said main body portion may be formed by a topsheet being disposed on said body-facing surface, a backsheet being disposed on said garment-facing surface, and an absorbent core being positioned therebetween, said first flap, said second flap and said joining part being formed by a portion of said backsheet which is extending from at least side edges of said absorbent core. Said zone of extensibility may be formed by a corrugated region which is imparted to a portion of said extending backsheet, and wherein no corrugated region is imparted in the major parts of said first flap and said second flap which are adjacent to said corrugated region.

Said zone of extensibility may have a extensibility in at least one direction, and is extendable in accordance with a tensile force that is applied to said joining part when said first flap is folded over along the side edge of the leg opening of the undergarment. A ratio of extension of said zone of extensibility may be 10% or more, and be preferably 30% or more.

Additionally, an extension range in said joining part from the longitudinal side edges of said main body portion to distal edges of said joining part may be 10% or more of a shorter of extension ranges from said main body portion to the distal edges of said first flap and said second flap. An extension range in said joining part from the longitudinal side edges of said main body portion to distal edges of said zone of extensibility is no more than 140% of a longer of extension ranges from said main body portion to the distal edges of said first flap and said second flap. Preferably, the extension range in said joining part from the longitudinal side edges of said main body portion to the distal edges of said zone of extensibility may be 30% or more of the shorter of the extension ranges from said main body portion to the distal edges of said first flap and said second flap. Moreover, the extension range in said joining part from the longitudinal side edges of said main body portion to the distal edges of said zone of extensibility may be no more than 120% of the longer of the extension ranges from said main body portion to the distal edges of said first flap and said second flap. Preferably, the extension range in the joining part from the longitudinal side edges of said main body portion to the distal edges of said zone of extensibility may be nearly equal to the extension range from said main body portion to the distal edges of said

first flap or said second flap, and wherein a line that connects said distal edges each other may be nearly parallel to the longitudinal side edges of said main body portion.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a top plan view of an embodiment of a sanitary napkin according to the present invention.

Fig. 2 is a transverse cross-sectional view taken along line II-II of Fig. 1.

Fig. 3 is a transverse cross-sectional view taken along line III-III of Fig. 1.

Fig. 4 is a partially cut-away top plan view of another embodiment of the flap shape.

Fig. 5 is a partially cut-away top plan view of another embodiment of the flap shape.

Fig. 6 is a partially cut-away top plan view of another embodiment of the flap extension direction.

Fig. 7 is a partially cut-away top plan view of yet another embodiment of the flap extension direction.

Fig. 8 is a simplified perspective view of an apparatus that imparts extensibility to a sanitary napkin according to the present invention.

Fig. 9 is a partially enlarged exploded view of an apparatus that imparts extensibility to a sanitary napkin according to the present invention.

Fig. 10 is a segmented cross-sectional view of an apparatus that imparts extensibility to a sanitary napkin according to the present invention.

Fig. 11 is a half cut-away plan view which shows the condition of a sanitary napkin according to the present invention positioned on an undergarment.

Fig. 12 is a perspective view which shows the condition of a sanitary napkin according to the present invention positioned on an undergarment.

Fig. 13 is a plan view as seen from the inside of an undergarment of the condition of a sanitary napkin according to the present invention positioned on an undergarment.

Fig. 14 is a plan view as seen from the outside of an undergarment of the condition of a sanitary napkin according to the present invention positioned on an undergarment.

DETAILED DESCRIPTION OF THE INVENTION

A preferred embodiment of a sanitary napkin 20 according to the present invention is shown in Fig. 1. As shown in Fig. 1, the sanitary napkin 20 is basically formed by an absorbent means (that is, a "main body portion") 22, and two flaps 24. The sanitary napkin 20 has a body-facing surface 20A and a garment-facing surface 20B. The sanitary napkin 20 is shown in Fig. 1 to enable a view of the body-facing surface 20A. The body-facing surface 20A is disposed so as to be in close contact with the body of the wearer, and the garment-facing surface 20B is disposed so as to be in close contact with the wearer's undergarment when the sanitary napkin is in use.

The sanitary napkin 20 has a longitudinal center line L and a transverse center line T. The term "longitudinal", as used herein, refers a line, an axis, or a direction in the plane of the sanitary napkin 20 which is aligned with a vertical plane that bisects a standing wearer into left and right body halves when the sanitary napkin is worn. The term "transverse", as used herein, refers a line, an axis, or a direction which lies within the plane of the sanitary napkin 20 which is perpendicular to the longitudinal direction.

As shown in Fig. 1, the main body portion 22 of the sanitary napkin 20 comprises the portion of the sanitary napkin without the flap 24. The main body portion 22 coincides closely to the shape of the absorbent core 42, and has two longitudinal side edges 26 disposed so as to have a spacing therebetween, and two transverse edges 28 disposed so as to have a spacing therebetween. The main body portion 22 also has two end regions which are designated as a first end region 32 and a second end region 34, and a central region 36 which is disposed between the end regions 32 and 34. The central region 36 further has a first central region 36A which is in close contact with the first end region 32, and a second central region 36B which is in close contact with the second end region 34.

The main body portion 22 of the sanitary napkin 20 can be of any thickness, such as, for example, relatively thick, of medium thickness, relatively thin, or extremely

thin. An ultra-thin sanitary napkin 20 such as noted in USP 4,950,264 and USP 5,009,653 issued to Osborn, preferably has a thickness of 3 mm or less. The embodiment of a sanitary napkin 20 shown in the drawing is that of the example of a sanitary napkin having a medium thickness. The main body portion 22 of the sanitary napkin 20 can be made relatively flexible, to avoid imparting a feeling of discomfort to the wearer.

Fig. 2 shows the individual components of the main body portion 22 of the sanitary napkin 20 according to the present invention. The main body portion of the sanitary napkin preferably is formed by at least three main elements. These include a liquid pervious topsheet 38, a liquid impervious backsheet 40, and an absorbent core 42 which is positioned between the topsheet 38 and the backsheet 40. The topsheet, backsheet, and absorbent core can be assembled using a widely known method.

There are a number of preferred materials for use as the elements of the main body portion 22 of the sanitary napkin 20, and forms of assembly of such elements, these being disclosed in USP 4,321,924 "Bordered Disposable Absorbent Article" issued to Ahr on March 30, 1982, UPS 4,425,130 "Compound Sanitary Napkin" issued to Des Marais on January 10, 1984, USP 4,950,264 "Thin, Flexible Sanitary Napkin" issued to Osborn on April 21, 1990, USP 5,308,346 "Elasticized Sanitary Napkin" issued to Sneller, et al. on May 3, 1994, and USP 5,389,094 "Absorbent Article Having Flaps and Zones of Differential Extensibility" issued to Lavash, et al. on February 14, 1995. The main body portion 22 of the sanitary napkin, as disclosed in WO 93/01785 or WO 93/01786, can also be comprised of a combination of one or more extensible elements.

Fig. 1 through Fig. 3 show a preferred embodiment of the sanitary napkin 20 that is an example in which a topsheet 38 and a backsheet 40 having a length and width dimensions that are both greater than those of the absorbent core 42 hold the absorbent core 42 between them. The topsheet 38 and the backsheet 40 extend beyond the edge part of the absorbent core 42. The topsheet 38 preferably is connected to the body-facing surface of the absorbent core 42, and the backsheet 40 preferably is connected to the garment-facing surface of the absorbent core 42. The topsheet 38 and the backsheet 40 are connected to the absorbent core 42 by a widely known means, such as by adhesive attachment using an adhesive. The portions of the topsheet 38 and backsheet 40 that extend beyond the edge of the absorbent core 42 are also mutually connected. The topsheet 38 and the backsheet 40 are connected by a widely known

method. Preferably, in the embodiment shown in the drawings, the portions of the topsheet 38 and backsheet 40 which extend beyond the edge of the absorbent core 42 are connected by means of an adhesive over substantially the entire portions that extend beyond the edges of the absorbent core 42. The transverse edge 28 of the main body portion is sealed to the topsheet 38 and the backsheet 40 by application of pressure and heat.

The sanitary napkin 20 which is shown in Fig. 1 through Fig. 3, as described above, further has a pair of flaps 24 which are connected to main body portion 22. The flaps 24 have proximal edges 44 disposed at longitudinal side edges 26 of the main body portion 22 and distal edges 46 disposed at the transversely outward of the proximal edges 44, and extend transversely outward from these proximal edges 44 toward these distal edges 46. As shown by the double-dot broken line in Fig. 1, the proximal edge 44 of the flap 24 can be nearly a straight line along the side edge 26 of the main body portion 22. The proximal edge of the flap 24 can be formed in a straight line in this manner, but is not thus limited, and can also be in the shape of a curved line that is not parallel to the side edge 26 of the main body portion 22, and in the case in which the side edge of the main body portion 22 is a curve, can be a curve that is parallel thereto. The distal edge 46 is a straight line that is parallel to the proximal edge 44.

The flap 24 is configured so as to extend continuously in the longitudinal direction along the second end region 34 and the central region 36 of the main body portion 22, and to extend in the transversely outward from the longitudinal side edge 26 in these regions. As shown in Fig. 1, each of these flaps 24 has a first flap portion 100 which extends from the first central region 36A of the main body portion 22, a second flap portion 102 which extends from the second end region 34 of the main body portion 22, and a joining flap portion 104 which extends from the second central region 36B of the main body portion 22.

The first flap 100 is disposed so as to be offsetted in the longitudinal forward direction of the sanitary napkin (upward in Fig. 1), and is used by folding it over along a side edge of a leg opening of the undergarment when the sanitary napkin is used. The second flap 102 is disposed so as to be offsetted in the longitudinal rearward direction of the sanitary napkin 20 (downward in Fig. 1), and maintains its broadened condition within the undergarment when the sanitary napkin 20 is used. Additionally, the transverse width between the second flaps 102 is established as being wider than that

of the portion of the main body portion 22 which is sandwiched between the first flaps 100. By doing this, in the crotch area of the undergarment, the first flap is folded over the undergarment, thereby protecting the side edge of the leg opening of the undergarment. In addition, in the rear part of the undergarment which is at the rear of the crotch area, the second flap, which is formed to be wide, broadens within the undergarment, thereby increasing the effect of protecting the rear part.

The joining flap 104 connects the first flap 100 and the second flap 102, which each extends from the main body portion 22, in the longitudinal direction. In the example illustrated in the drawings, the ranges of extensions of the first flap 100 and the second flap 102 from the proximal edge 44 are the same. The extension range of the joining flap 104 that connects these flaps is also the same. By doing this, distal ends of the first flap 100, the second flap 102, and the joining flap 104 are connected in a straight line, and are parallel with the proximal edge 44, respectively.

However, the distal edges of each flap do not need to be parallel to the respective proximal edge 44, it is possible for them to be straight lines not parallel to the proximal edge 44, curved lines, or step-shaped. For example, as shown in Fig. 4, in the case in which the extension range of the flap 24 from the proximal edge 44 increases gradually from the first flap 100 towards the second flap 102, the distal edge 46 of the flap 24 is a straight line (the solid line in Fig. 4) which is inclined so as to increase in distance from the proximal edge 44 along the direction toward the second flap 102. On the other hand, in the case in which the extension range decreases gradually from the first flap 100 toward the second flap 102, the distal edge 46 of the flap 24 is a straight line (dotted line in Fig. 4) which is inclined so as to decrease in distance from the proximal edge 44 along the direction toward the second flap 102.

Further, as shown in Fig. 5, it is possible for the distal edges 106, 108, and 110 of each flap to be configured in the shape of a stairs. In the example illustrated, the extension range of each flap increases in the sequence of joining flap 104, first flap 100, second flap 102. Therefore, the distal edge 46 of the flap 24 is in the shape of stairs which is closest at the joining flap 104 part to the proximal edge 44. Additionally, because the extension range of the joining flap 104 is maximum, as shown by the dotted line in Fig. 5, the distal edge 46 of the flap 24 is in the shape of stairs, with the joining flap 104 part the farthest from the proximal edge 44.

The extension range from the proximal edge to the distal edge of the joining flap 104 can be appropriately set. However, if this extension range is too small, when the first flap 100 is folded over, it can not provide sufficient protection around the leg opening of the undergarment. If the extension range is too large, it becomes difficult to position the joining flap on the undergarment. Therefore, the value S of the extension range of the joining flap is not limited by this, but is preferably set as follows. Specifically, the lower limit of the extension range S is preferably 10% or more of the smaller value of the extension range P of the first flap 100 and the extension range Q of the second flap 102. It is more preferable that this be 30% or more thereof. The upper limit of the extension range S is preferably no more than 140% of the larger of the extension range P of the first flap 100 and the extension range Q of the second flap 102. It is more preferable that this be no more than 120% thereof.

The flap 24 is joined to the main body portion 22 by various methods. The term "join", as used herein, encompasses configurations in which a given element is mounted directly to another element, configurations in which a given element is mounted to another element with an intervening element therebetween, and configurations in which a given element is formed as one with another element (for example, the case in which one elements is part of another element). Preferably, in embodiment shown in Fig. 1 through Fig. 3, the flap 24 is part of the main body portion 22. That is, flap 24 is configured as the extending part of the topsheet 38 and backsheet 40.

In another embodiment, the flap 24 can be formed from one or more elements that are joined to the garment-facing surface of the main body portion 22. For example, the flaps on both side edges of the main body portion can be formed from separate elements which are joined to the garment-facing surface of the main body portion 22. In this type of embodiment, it is preferable that the flap 24 not be joined to the garment-facing surface of the main body portion of the sanitary napkin between the part of the main body portion to which the flap is joined and the longitudinal edge of the main body portion. In an example such as this, it is possible to use an appropriate method to fix the flap to the garment-facing surface of the main body portion. One example would be that of adhesively fixing it with the use of adhesives, and the like.

The flap 24 is joined to the main body portion 22 along a joint part. This is typically a joining part in the longitudinal direction. The term "joint part" (or "joint line") used herein means a region which either extends from or makes contact with the

main body portion 22. This region is not limited to being a line, and can be various curves or a straight line. In the embodiment shown in Fig. 1, the joint line can be treated as coinciding with a the proximal edge of the flap 24.

The sanitary napkin 20, as shown in Fig. 1, has an extensible region 116 in part of the flap 24. This extensible portion 116 is a region that has become extensible by mechanically deformed, as will be described later. In the drawings which show this embodiment, the extensible region 116 that has been mechanically deformed is shown by a collection of lines. In the embodiment which is shown in Fig. 1, the extensible region 116 is formed as the region bound by the curve 114 which defines the outside in the transverse direction, the curve 112 which defines the inside in the transverse direction, and the line which defines the outside of the sanitary napkin. The curve 114 coincides with the semicircular portion of the intermediate region 118 that is approximately a half circle in transversely outward of the first flap 100. The curve 112, at the forward part of the sanitary napkin 20 (top in Fig. 1), curves in proximity to the proximal edge 44 of the flap 24, and is closest to the proximal edge 44 at the first flap 100 part. The curve 112, at the rear part of the sanitary napkin (bottom in Fig. 1), curves so as to increase in distance away from the proximal edge 44 toward the distal edge 46.

The extensible region 116 is further comprising a forward extensible region 120, a central extensible region 54, and a rear extensible region 122. The major part of the rear extensible region 122 is disposed within the joining flap 104. Part of the rear extensible region 122 extends so as to be adjacent to the central extensible region 54 which is positioned in proximity to the proximal edge of the first flap 100. The shape of the rear extensible region 122 is not limited to that shown in the illustrated embodiment. Thus, when the sanitary napkin 20 is used, it is sufficient to have an extensible region in the joining flap 104 region in which an elastic element of the undergarment is disposed. Furthermore, in the illustrated embodiment, the sanitary napkin 20 has a forward extensible region 120 which is offsetted toward the front of the first flap 100 (top in Fig. 1).

Referring to Fig. 1, in the flap 24, the regions which are not subjected to mechanical deformation are the nearly semicircular intermediate region 118 of the flap 100, the major part of the second flap 102, and a proximal edge 44 side part of the joining flap 104 that is adjacent thereto. Because the intermediate region 118 is not subjected to mechanical deformation, it is harder than the region which is subjected to

mechanical deformation. Because of this hardness, when the first flap 100 is folded over around the undergarment, it is easy to handle the first flap 100 and to perform the task of folding over the first flap 100. Because the major portion of the second flap 102 is also not subjected to mechanical deformation and is hard, its tendency to maintain its broadened condition within the undergarment is increased. The shape of the region of the flap 24 that is subjected to mechanical deformation (for example, the intermediate region 118) is not limited to the shape in the above-noted embodiment, and can also be some other shape. It is possible to have the first flap 100 and part, all, or the major part of the second flap 102 be an extensible region which is subjected to mechanical deformation.

The rear extensible region 122 is extensible in the direction indicated by the arrows marked X in Fig. 1. In the illustrated embodiment, the extension direction X of the rear extensible region 122 is inclined at an angle of 45 degrees with respect to the transverse center line of the sanitary napkin 20. In this specification, the angle of "inclination" is taken to be 0 degree in a direction that is parallel to the transverse center line T of the sanitary napkin 20, and is taken to be 90 degree in a direction that is parallel to the longitudinal center line L of the sanitary napkin 20. In Fig. 1, the "inclination" angle of the flap 24 which is disposed at the right side of the longitudinal center line L is taken to be positive (+) if a straight line indicating the direction is higher at the right, and negative (-) if the straight line indicating the direction is lower at the right. In Fig. 1, the "inclination" angle of the flap 24 that is disposed at the left side of the longitudinal center line is taken to be positive (+) if a straight line indicating the direction is higher at the left, and negative (-) if the straight line indicating the direction is lower at the left. Therefore, the above-noted extension direction X in Fig. 1 is at an inclination angle of +45 degrees.

The extension direction X of the rear extensible region 122 should be greater than 0 degree and should be no greater than +90 degrees, which includes the above-noted +45 degrees (that is, 0 degree < inclination angle <= +90 degrees). Fig. 6 shows the case in which the extension direction X of the rear extensible region 122 is +90 degrees. The directing angle of the extension direction X is within a range of angles defined in this manner, so that with respect to the tensile force generated in the joining flap 104 when the first flap 100 is folded over, the extension of the joining flap 104 in an appropriate direction acts to moderate the tensile force. In addition, the angle of the extension direction X is preferably such that +45 degrees <= inclination angle <=+90 degrees.

The forward extensible region 120 has an extensibility in the direction indicated by the arrows marked Y in Fig. 1. In the illustrated embodiment, the extension direction Y of the forward extensible region 120 is parallel to the transverse center line T of the sanitary napkin 20, which is 0 degree. The extension direction Y of the forward extensible region 120 is not limited to what it is in this embodiment, and can be no more than 0 degree, and -90 degrees or greater (0 degree >= inclination angle >= -90 degrees) which includes the case of -45 degrees for the extension direction Y of the forward extensible region 120 shown in the example of Fig. 7. Because the extension direction Y of the forward extensible region 120 is also within a range of angles defined in this manner, with respect to the tensile force generated in the forward part of the first flap 100 when the first flap 100 is folded over, the forward part of the first flap 100 extends in an appropriate direction, so as to moderate the tensile force. In addition, the angle of the extension direction Y is preferable such that -45 degrees >= inclination angle >= -90 degrees.

The extension direction of the central extensible region 54 is a direction in Fig.1. that is parallel to the transverse center line T of the sanitary napkin 20, which is 0 degree. However, there is no limit imposed on the extension direction of the central extensible region 54. The central extensible region 54, in the illustrated embodiment, has three undeformed regions 55 along the vertical direction which are not subjected to mechanical deformation. In the illustrated embodiment, the forward undeformed region 55 (at the top in Fig. 1) defines the borderline to the forward extensible region 120, and the rear undeformed region (at the button in Fig. 1) defines by the borderline to the rear extensible region 122. Because the undeformed regions 55 are not subjected to mechanical deformation, they are hard, compared with the extensible region 116. For this reason, the region near the proximal edge of the first flap 100 is relatively difficult to bend. Therefore, the first flap 100 does not bend in an unexpected manner. While in this embodiment undeformed regions 55 are provided, it is also possible to omit these undeformed regions 55. It is further possible to have one or two undeformed regions and to have four or more undeformed regions.

The preferred ratio of extension of the rear extensible region 122 of the present invention is 10% or greater. In the case in which the ratio of extension of the rear extensible region 122 is less than 10%, the rear extensible region 122 does not extend sufficiently with respect to tension that is generated when the first flap 100 is folded under the undergarment. Therefore, this tensile force can change the path of the elastic

element in the undergarment, or act to pull on even the main body portion 22, this resulting in bunching (of the main body portion). On the other hand, if it is greater than 10%, the rear extensible region 122 extends sufficiently in response to the tensile force. Therefore, there is little danger of changing the path of the elastic element in the undergarment, and it is possible to properly enclose the elastic element portion of the undergarment. In addition, because there is little pulling on the main body portion 22, it is difficult for the main body portion 22 to exhibit bunching. Additionally, it is preferable that the rear extensible region 122 ratio of extension be 30% or greater, and further preferable that it be 50% or greater. The forward extensible region 120 and central extensible region 54 can be made to have the same kind of ratio of extension.

The extensible region 116 of the above described sanitary napkin 20 can be formed by a variety of methods that impart a high degree of flexibility to the desired region of the sanitary napkin 20. The extensible region 116 preferably is formed by mechanically deforming a prescribed region of the sanitary napkin 20.

The extensible region 116 can be formed by a method known as ring rolling. A preferred method of ring rolling is disclosed in USP 4,107,364 issued to Sisson on August 15, 1978, USP 4,834,741 issued to Sabee on May 30, 1989, USP 5,143,679 issued to Gerald M. Weber et al on September 1, 1992, USP 5,156,793 issued to Kenneth B. Buell et al on October 20, 1992, and USP 5,167,897 issued to Gerald M. Weber et al on December 1, 1992.

As shown in Fig. 8, an extensible region 116 is formed in the sanitary napkin 20 by passing it through a corrugation-imparting apparatus 300 so that a prescribed region is subjected to a mechanical deformation of corrugation. The corrugation-imparting apparatus 300 has an upper roll 302 and a lower roll 304. The upper roll 302 comprises a pair of wheels 306 each having a peripheral surface which partially protrudes. For the purpose of imparting a corrugated shape to the flap 24 to form the extensible region 116 of the sanitary napkin 20, the protruding surfaces of the wheels 306 have a plurality of teeth 308 provided thereon. In Fig. 8, the teeth 308 are hidden at the rear of the wheel 306. The shape of the teeth 308 is shown in Fig. 9. Fig. 9 shows a planar development of the pattern of the teeth 308 which are cut into the wheel 306. As is clear from Fig. 9, the pattern of the teeth 308 which is cut into one of the wheels 306 coincides with the shape of the extensible region 116 which is imparted to one of the flaps 24 of the sanitary napkin 20. The surface of the other wheel 306 has a pattern (not shown in the drawing) which is symmetrical with respect to the pattern

shown in Fig. 9. The surface of the lower roll 304 has the pattern of the teeth 310 which mesh with the pattern of the teeth 308 of the upper roll 302 (refer to Fig. 10). The wheels 306 are mounted on the roll 302 at a spacing so as to position them at the two flaps 24 of the sanitary napkin 20. The teeth 310 of the lower roll 304 are mounted onto the roll 304 so as to mesh with the teeth 308 of the upper roll 302. Additionally, as shown in Fig. 10, the wheels 306 have an upper contacting piece 314, and the corrugated lower roll 304 has a lower contacting piece 316. These contacting pieces 314 and 316 make mutual contact, enabling the maintenance of a constant amount of mesh between the teeth 308 and the teeth 310. By adjusting this amount of contact, it is possible to impart a desired ratio of extension to the workpiece.

A sanitary napkin 20 is fed to a corrugation-imparting apparatus 300 having the configuration as described above in the direction shown by the arrow in Fig. 8. The flap 24 part is passes between the wheels 306 and the lower roll 304. When this happens, a laminate 312 comprising a topsheet 38 and a backsheet 40 is mechanically deformed by the upper and lower teeth 308 and 310, so that the laminate 312 has permanent corrugations as shown in Fig. 10. Extensibility to the degree that shapes of corrugation in the surface thereof can be flattened is imparted to the laminate 312 (flap 24) having deformations of corrugation. Because the shapes of corrugation are imparted in a direction that is perpendicular to the direction in which the teeth 308 and 310 extend (the direction in which the protruding and depressed parts of teeth 308 and 310 extend), the extensibility that is imparted is in the direction that is perpendicular to the direction in which the teeth 308 and 310 extend. By changing the direction in which the teeth 308 and 310 extend, it is possible to obtain the extension directions of the above-described extensibility regions 122, 54, and 120. As described above, in this embodiment the extensible region 116 is expressed as a set of lines. These lines show the permanently formed corrugated hills and valleys of the extensible region 116.

Next, the condition of a sanitary napkin according to the present invention when affixed will be described, with reference being made to Fig. 11 through Fig. 14. In Fig. 11, the sanitary napkin 20 is located within the undergarment 200 so that the elastic element 202 which is affixed to the leg opening side edge of the undergarment 200 is positioned at the extensible region 116 of the flap 24. As shown in Fig. 12, the first flap 100 is folded over along the elastic element 202. When the first flap 100 is folded over, the joining flap 104 is also folded over so as to enclose the elastic element 202. Therefore, compared to a sanitary napkin of the past, which did not have an joining flap, it is possible to widen the protected area at the side edges of the leg

openings of the undergarment 200. In Fig. 12 and Fig. 13, the widened protected area of the joining flap 104 is indicate by the letter S. When the first flap 100 is folded over, a tensile force is applied to the flap 24 in the direction of the arrow shown in Fig. 11. However, the various extensive regions of the flap 24 have the above-described extension directions and extension ratios. Therefore, by folding over the first flap 100, there is no danger of changing the path of the elastic element 202 of the undergarment, and it is possible to properly enclose the elastic element 202 of the undergarment. In addition, because there is little pulling on the main body portion 22, it is difficult for the main body portion 22 to exhibit bunching (refer to Fig. 13 and Fig. 14).

The garment-facing surface of the sanitary napkin includes means for attaching the sanitary napkin to the undergarment of the wearer. Fig. 1 shows a central fastening means 80 provided for the purpose of attaching the main body portion 22 of the sanitary napkin to the crotch region of an undergarment. It is possible to use a known means as this fastening means. For example, it is possible to use an adhesive layer or a mechanical fastener. The fastening means having an adhesive layer have been found to work well for this purpose, with a pressure-sensitive adhesives being preferred. Fig. 1 shows an example which utilizes a pair of spaced apart longitudinally-oriented strips or adhesive layers 80 that are centered about the longitudinal center line L.

The outer surfaces of the intermediate regions 118 of the first flaps 100 are provided with first flap adhesive layers 82. After the first flap adhesive layers 82 are folded over around the side edges of the leg opening of the undergarment, they are used to maintain the first flaps in place. An example of an appropriate adhesive layer is described in greater detail in USP 4,917,697.

In addition, the outer surfaces of the second flaps 110 are provided with second flap adhesive layers 83. These second flap adhesive layers 83 are used to assist in maintaining them in a broadened condition within the undergarment. These adhesive layers may be the same as the first flap adhesive layers 82.

The adhesive layers are protected by a central fastening means release liner and a flap release liner indicated as 84. These release liners 84 protect the adhesive layers from coming into contact with other parts before they are used. An appropriate peel-off liner is disclosed in USP 4,917,697. A release liner which is preferable for use as an individual package to hold the sanitary napkin itself is disclosed in USP 4, 556, 146, issued to Swanson et al.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. An absorbent article comprising a main body portion, said main body portion comprising a liquid pervious body-facing surface, a liquid impervious garment-facing surface, and an absorbent core positioned between said body-facing surface and said garment-facing surface, said absorbent article comprising:

a first flap extending laterally outward from longitudinal side edges of said main body portion, said first flap is adapted to be folded over along a side edge of a leg opening of a wearer's undergarment,

a second flap disposed at a position that is offsetted to one of longitudinal end edges of said absorbent article, said second flap being formed with a larger width than a transverse width of said main body portion at which said first flap is positioned, said second flap is adapted to be maintained in a broadened condition within the wearer's undergarment,

a joining part connecting said first flap with said second flap on the outside of the longitudinal side edges of said main body portion, and

a zone of extensibility provided in a region of at least a portion of said joining part where the side edge of the leg opening of the undergarment are placed when said absorbent article is used,

said zone of extensibility, which is provided at said joining part, is extending to enclose the side edge of the leg opening of the undergarment when said first flap is folded over along the side edge of the leg opening of the undergarment.

2. The absorbent article according to claim 1, wherein said joining part is a region that is enclosed between said first flap and said second flap in a longitudinal direction, said zone of extensibility comprising a corrugated region which is imparted to at least a portion of said joining part.

3. The absorbent article according to claim 2, wherein said first flap and said second flap comprising a region with lower extensibility than that of said zone of extensibility.

4. The absorbent article according to claim 3, wherein said main body portion is formed by a topsheet being disposed on said body-facing surface, a backsheet being disposed on said garment-facing surface, and an absorbent core being positioned therebetween, said first flap, said second flap and said joining part being formed by a portion of said backsheet which is extending from at least side edges of said absorbent core.

5. The absorbent article according to claim 4, wherein said zone of extensibility is formed by a corrugated region which is imparted to a portion of said extending backsheet, and wherein no corrugated region is imparted in the major parts of said first flap and said second flap which are adjacent to said corrugated region.

6. The absorbent article according to claim 1, wherein said zone of extensibility has a extensibility in at least one direction, and is extendable in accordance with a tensile force that is applied to said joining part when said first flap is folded over along the side edge of the leg opening of the undergarment.

7. The absorbent article according to claim 6, wherein a ratio of extension of said zone of extensibility is 10% or more.

8. The absorbent article according to claim 6, wherein the ratio of extension of said zone of extensibility is 30% or more.

9. The absorbent article according to claim 1, wherein an extension range in said joining part from the longitudinal side edges of said main body portion to distal edges of said joining part is 10% or more of a shorter of extension ranges from said main body portion to the distal edges of said first flap and said second flap.

10. The absorbent article according to claim 9, wherein an extension range in said joining part from the longitudinal side edges of said main body portion to distal edges of said zone of extensibility is no more than 140% of a longer of extension ranges from said main body portion to the distal edges of said first flap and said second flap.

11. The absorbent article according to claim 10, wherein the extension range in said joining part from the longitudinal side edges of said main body portion to the distal edges of said zone of extensibility is 30% or more of the shorter of the extension ranges from said main body portion to the distal edges of said first flap and said second flap.

12. The absorbent article according to claim 11, wherein the extension range in said joining part from the longitudinal side edges of said main body portion to the distal edges of said zone of extensibility is no more than 120% of the longer of the extension ranges from said main body portion to the distal edges of said first flap and said second flap.

13. The absorbent article according to claim 12, wherein the extension range in the joining part from the longitudinal side edges of said main body portion to the distal edges of said zone of extensibility is nearly equal to the extension range from said main body portion to the distal edges of said first flap or said second flap, and wherein a line that connects said distal edges each other is nearly parallel to the longitudinal side edges of said main body portion.

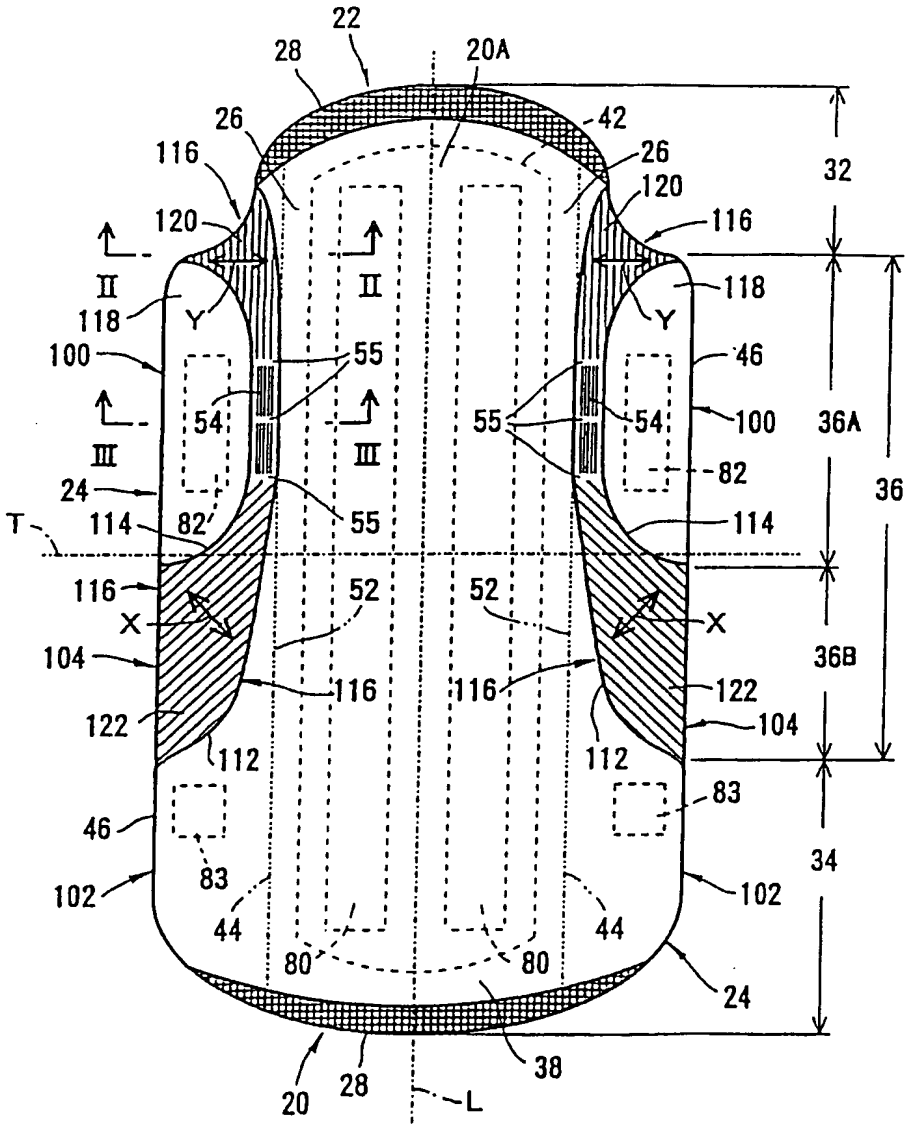
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Fig.1

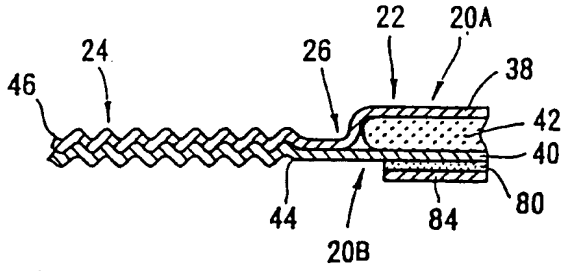
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Fig.2

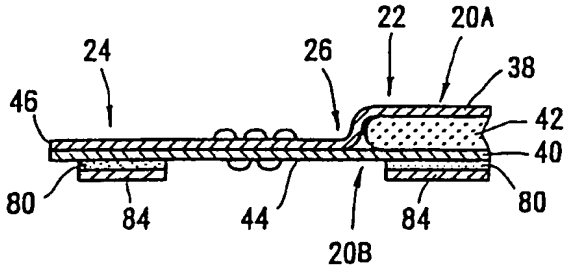
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Fig.3

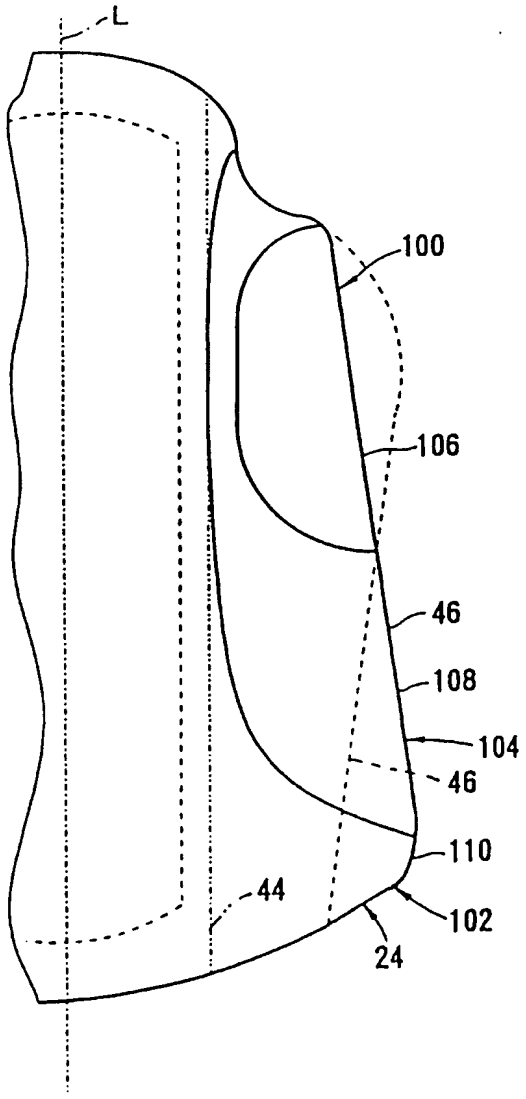

Fig.4

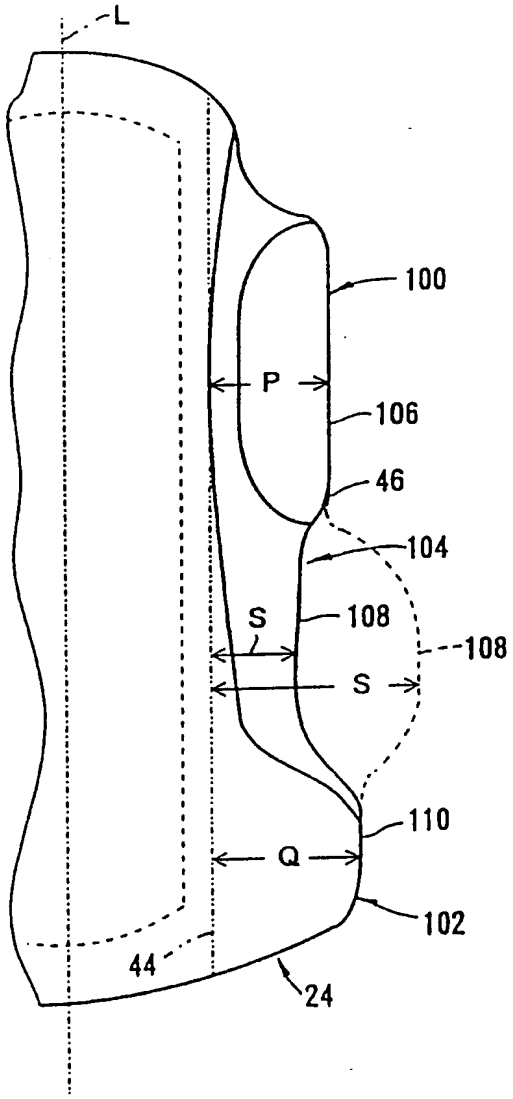

Fig.5

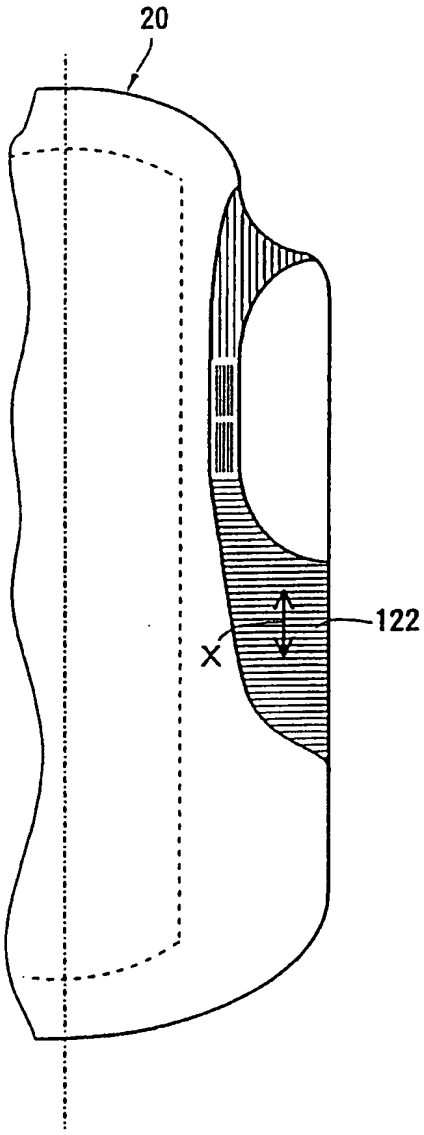

Fig.6

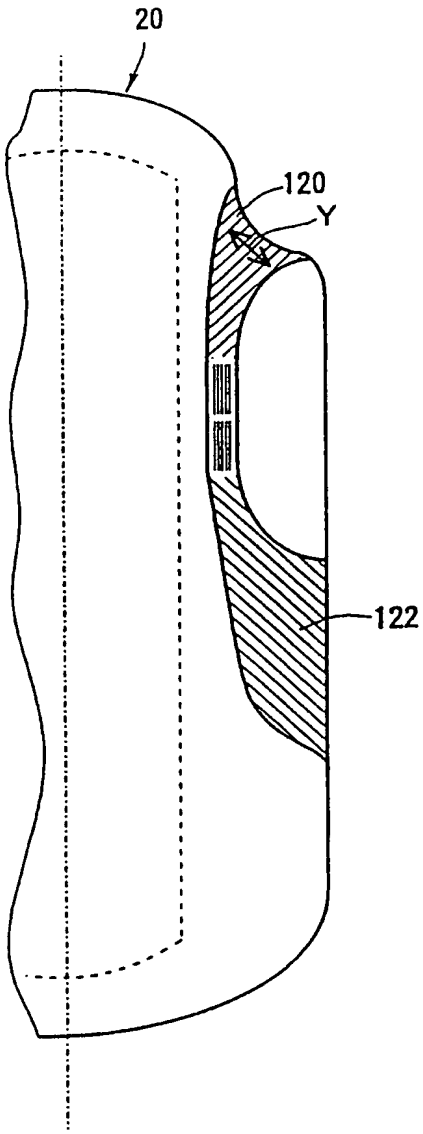

Fig.7

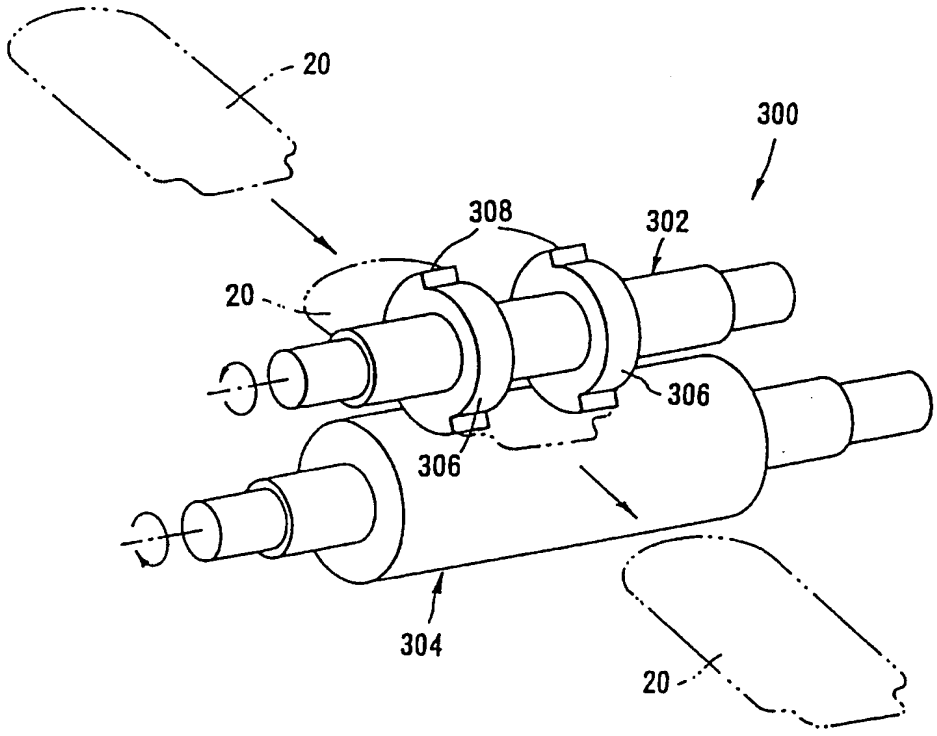

Fig.8

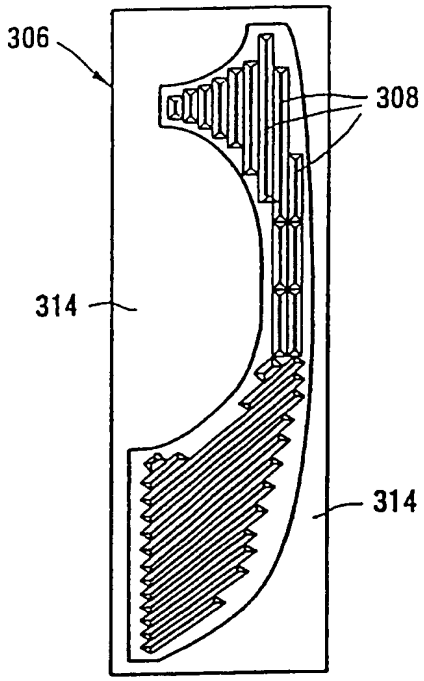

Fig.9

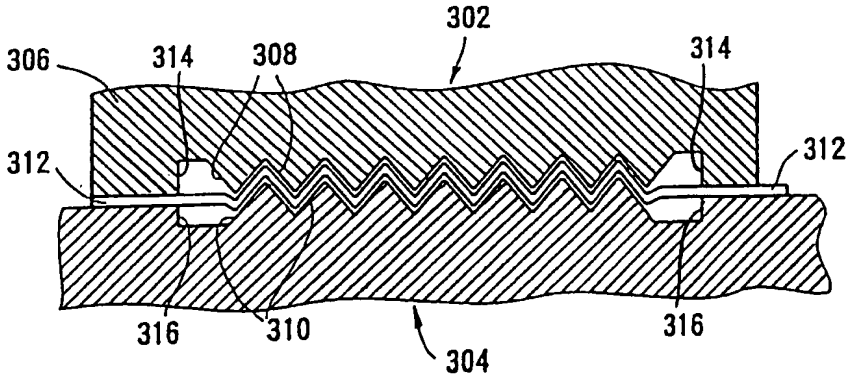

Fig.10

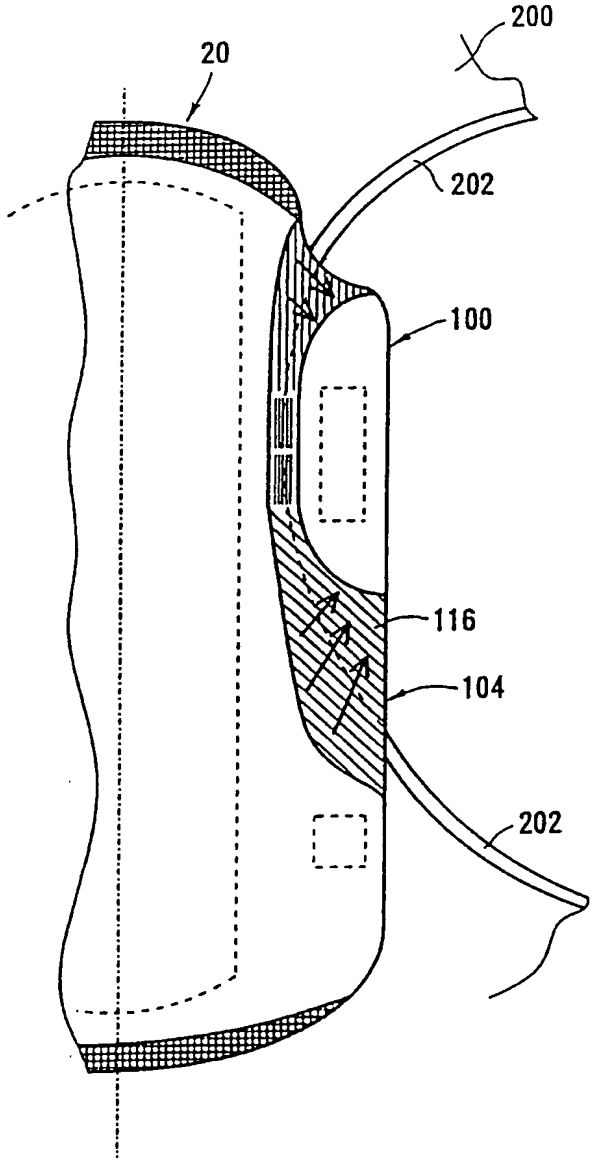

Fig.11

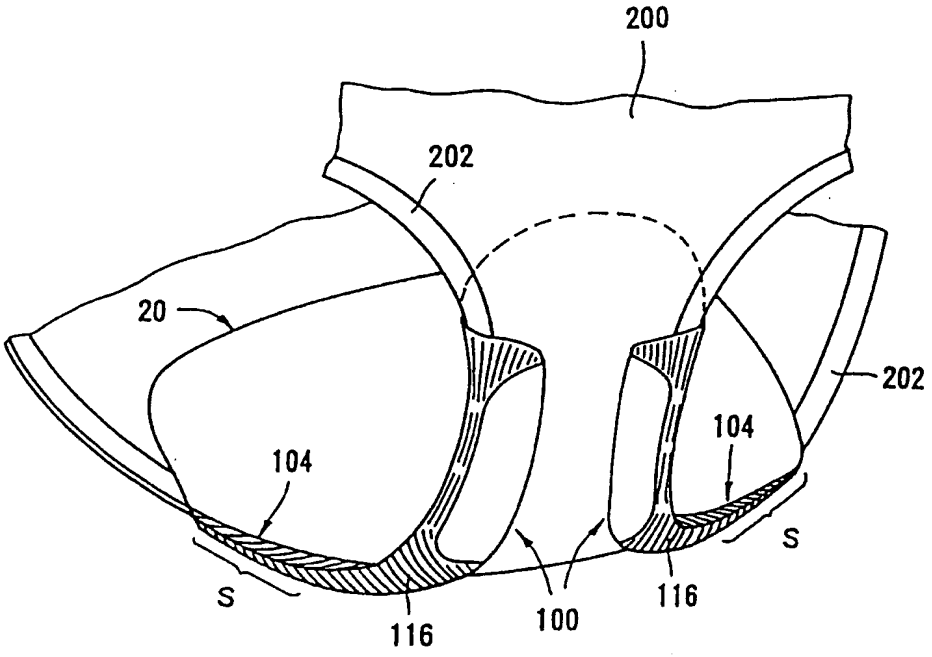

Fig.12

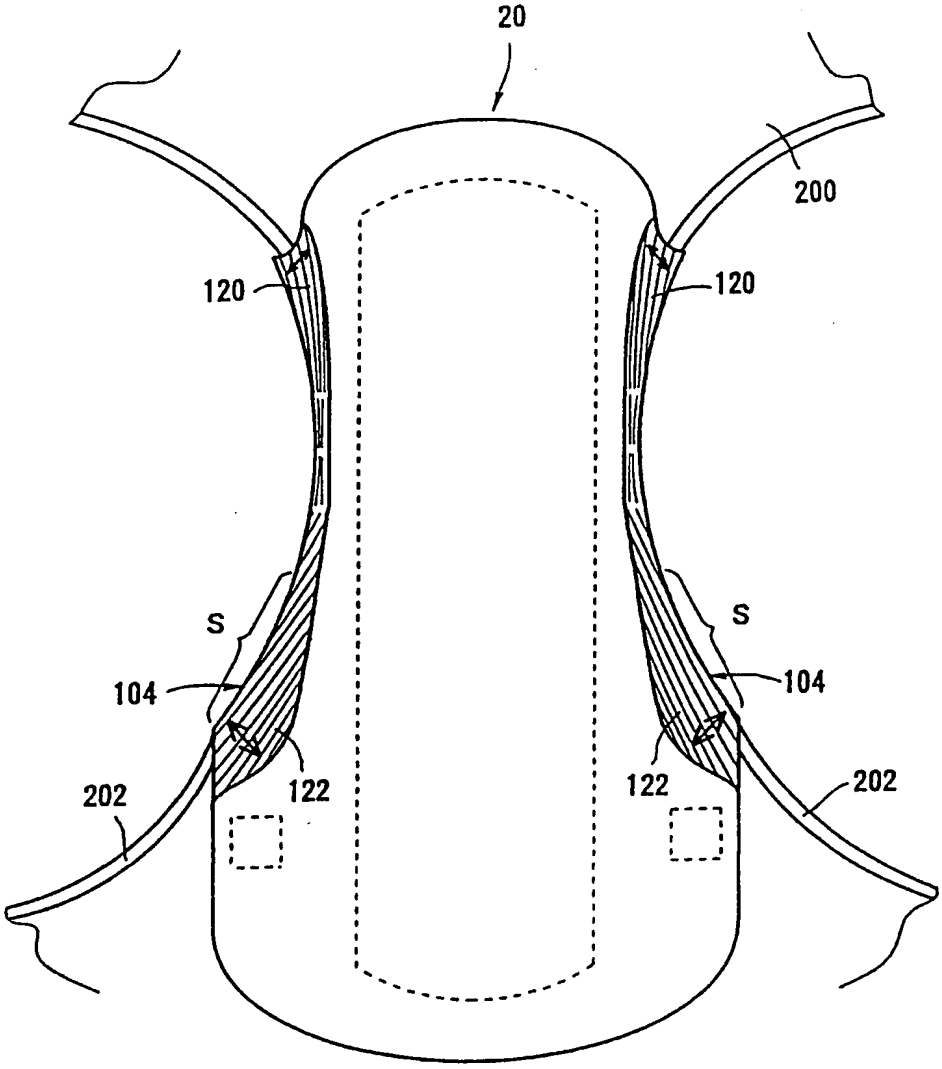

Fig.13

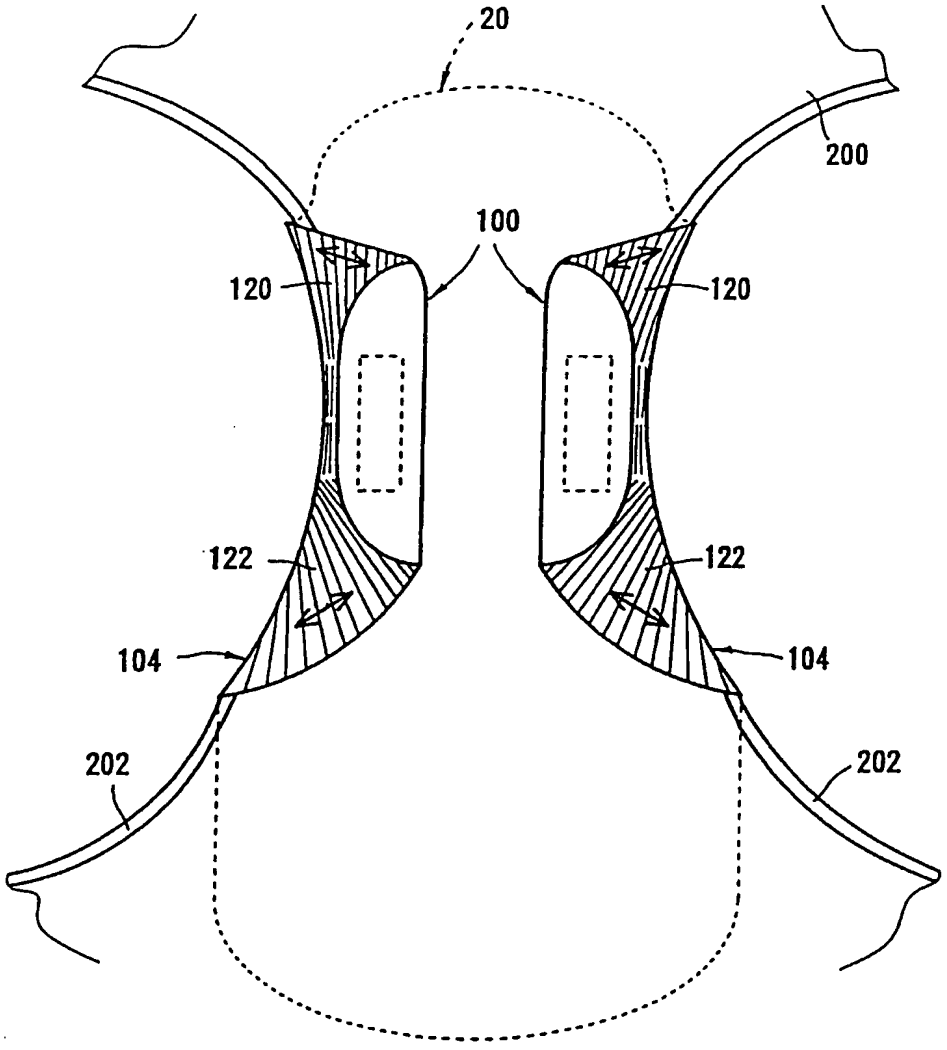

Fig.14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/12905

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61F 13/15
US CL :604/385.2, 387

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.1, 2385.2, 386, 387

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,518,801 A (CHAPPELL et al) 21 May 1996, Fig. 31.	1-13
A,P	US 5,611,790 A (OSBORN, III et al) 18 March 1997, Figs. 41 and 41A.	1-13
A,P	US 5,558,663 A (WEINBERGER et al) 24 September 1996, figures.	1-13

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 11 OCTOBER 1997	Date of mailing of the international search report 29 OCT 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer KARIN REICHLE Telephone No. (703) 308-2617

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